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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,075	11/25/2003	Rangachary Mukundan	S-102,315	8636

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EXAMINER	
VATHYAM, SUREKHA	

ART UNIT	PAPER NUMBER
1753	

MAIL DATE	DELIVERY MODE
06/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/723,075	MUKUNDAN ET AL.	
	Examiner	Art Unit	
	Surekha Vathyam	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/25/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1 – 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muller et al. (US 4,277,323) in view of Carberry et al. (US 5,028,404).

Regarding claim 1, Muller ('323) discloses a gas sensor (10) comprising: an electrolyte body (32) having a first electrolyte surface (see fig. 2) with a reference electrode (30, 31) depending therefrom; a metal electrode body (30, 31) contained within the electrolyte body and having a first electrode surface coplanar with the first electrolyte surface (see fig. 2), wherein the electrolyte body and the metal electrode body have intimate contact there between (column 3, lines 41 – column 4, lines 23). Muller ('323) discloses the electrode to be a Pt or Au electrode (column 3, lines 50 – 54 and column 5, lines 7 – 12) but does not explicitly disclose the electrode to be a metal oxide.

Carberry ('404) teaches metal oxide as a viable alternative to noble metal catalysts including platinum in oxidation and hydrogenation reactions in combustion chamber exhaust gases (see abstract and column 1, line 58 – column 2, line 7). Carberry ('404) also teaches the metal oxide used as pellets, film or coatings on conventional refractory substances such as solid electrolytes (column 3, lines 5 – 13) and sintering them to very high temperatures (column 3, lines 18 – 26).

It would have been obvious to one of ordinary skill in the art to have substituted the metal electrode of Muller ('323) with the metal oxide of Carberry ('404) because as Carberry ('404) explains the metal oxide has high specific activity, superior resistance to sintering and is immune to sulfur poisoning which makes it an ideal substitute for noble metal catalysts (column 1, line 65 – column 2, line 7).

Regarding claim 2, Carberry ('404) teaches the metal oxide to be $La_{1-x}A_xCrO_3$, where A is selected from the group consisting of Sr, Ca and Mg, and $0 \leq x \leq 0.5$ (column 1, lines 58 – 62 and column 2, lines 18 – 29).

Regarding claim 3, Carberry ('404) teaches A is Sr and x=0.2 (see tables 1 and 2, column 4, lines 27 – 33).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Muller et al. (US 4,277,323) in view of Carberry et al. (US 5,028,404) as applied to claim 1 above, and further in view of Mase et al. (US 4,755,274).

Regarding claim 4, Muller ('323) in view of Carberry ('404) discloses the electrolyte body is stabilized zirconia (column 3, lines 65 – 67) but does not expressly disclose the stabilizer to be yttria and does not expressly disclose the porosity of the electrolyte body.

Mase ('274) teaches a sensor comprising a ytrria stabilized zirconia electrolyte body (108) (column 9, lines 53 – 56) with a desired porosity for gas diffusion and measurement produced by sintering (column 13, lines 6 – 13).

It would have been obvious to one of ordinary skill in the art to stabilize the zirconia electrolyte body of Muller ('323) with yttria as taught by Mase ('274) and to produce a desired porosity of the electrolyte body by sintering as taught by Mase ('274) because as Mase ('274) explains the porosity of the electrolyte body is selected according to the required level of diffusion resistance and is a parameter to be optimized (column 13, lines 1 – 6).

6. Claims 1 – 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garzon et al. (US 5,543,025) in view of Carberry et al. (US 5,028,404).

Regarding claim 1, Garzon ('025) discloses a gas sensor (30) comprising: an electrolyte body (32) having a first electrolyte surface with a reference electrode (42) depending therefrom (see fig. 2); a metal (column 3, lines 7 – 8 and lines 23 – 24) electrode body (38) contained within the electrolyte body and having a first electrode surface coplanar with the first electrolyte surface (see fig. 2), wherein the electrolyte body and the metal electrode body have intimate contact there between (see fig. 2 and column 2, lines 20 – 25, column 3, lines 15 – 37). Garzon ('025) discloses a mixed conductor (34) made of metal oxide (column 3, lines 18 – 23) contained within the solid electrolyte body and coplanar with a first surface of the electrolyte body (see fig. 2 and column 3, lines 26 – 37) but does not explicitly disclose the mixed conductor to be an electrode. Garzon ('025) further discloses the electrode (38) to be made of a metal such as platinum (column 3, lines 7 – 8 and lines 23 – 24), but does not explicitly disclose the electrode being made of a metal oxide.

Carberry ('404) teaches metal oxide as a viable alternative to noble metal catalysts including platinum in oxidation and hydrogenation reactions in combustion chamber exhaust gases (see abstract and column 1, line 58 – column 2, line 7). Carberry ('404) also teaches the metal oxide used as pellets, film or coatings on conventional refractory substances such as solid electrolytes (column 3, lines 5 – 13) and sintering them to very high temperatures (column 3, lines 18 – 26).

It would have been obvious to one of ordinary skill in the art to have substituted the metal electrode of Muller Garzon ('025) with the metal oxide of Carberry ('404) because as Carberry ('404) explains the metal oxide has high specific activity, superior resistance to sintering and is immune to sulfur poisoning which makes it an ideal substitute for noble metal catalysts (column 1, line 65 – column 2, line 7).

Regarding claim 2, Carberry ('404) teaches the metal oxide to be $La_{1-x}A_xCrO_3$, where A is selected from the group consisting of Sr, Ca and Mg, and $0 \leq x \leq 0.5$ (column 1, lines 58 – 62 and column 2, lines 18 – 29).

Regarding claim 3, Carberry ('404) teaches A is Sr and x=0.2 (see tables 1 and 2, column 4, lines 27 – 33).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garzon et al. (US 5,543,025) in view of Carberry et al. (US 5,028,404) as applied to claim 1 above, and further in view of Mase et al. (US 4,755,274).

Regarding claim 4, Garzon ('025) in view of Carberry ('404) discloses the electrolyte body is yttria stabilized zirconia (column 3, lines 15 – 18) but does not expressly disclose the porosity of the electrolyte body.

Mase ('274) teaches a sensor comprising a ytrria stabilized zirconia electrolyte body (108) (column 9, lines 53 – 56) with a desired porosity for gas diffusion and measurement produced by sintering (column 13, lines 6 – 13).

It would have been obvious to one of ordinary skill in the art to to produce a desired porosity of the electrolyte body by sintering as taught by Mase ('274) because

as Mase ('274) explains the porosity of the electrolyte body is selected according to the required level of diffusion resistance and is a parameter to be optimized (column 13, lines 1 – 6).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kusanagi et al. (US 5,215,643) disclose a gas sensor (see figs. 1, 11 and 19) comprising a electrolyte body (16) with a reference electrode (14) and an active electrode (12) embedded in the electrolyte body and coplanar with it (column 13, lines 49 – 54).

Jue et al. (US 6,168,745) discloses Sr-doped $LaCrO_3$ electrodes in zirconia electrolyte.

La Grange et al. (US 3,303,033) disclose a method of compressing and sintering yttria stabilized zirconia electrolyte to obtain desired porosity and density (entire contents).

Gopalan et al. (US 6,492,051) discloses sintering yttria stabilized zirconia electrolyte body about a lanthanum chromite electrode body for intimate contact there between and obtaining desired porosity (column 2, line 49 – column 3, line 11).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Surekha Vathyam whose telephone number is 571-272-2682. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SV/
June 21, 2007

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